Retrieval of microphysical characteristics of particles in atmospheres of distant comets from ground-based polarimetry

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We summarize unique aperture data on the degree of linear polarization observed for distant comets C/2010 S1, C/2010 R1, C/2011 KP36, C/2012 J1, C/2013 V4, and C/2014 A4 with heliocentric distances exceeding 3 AU. Observations have been carried out at the 6-m telescope of the Special Astrophysical Observatory of the Russian Academy of Sciences (Nizhnij Arkhyz, Russia) during the period from 2011 to 2016. The measured negative polarization proves to be significantly larger in absolute value than what is typically observed for comets close to the Sun. We compare the new observational data with the results of numerical modeling performed with the *T*-matrix and superposition *T*-matrix methods. In our computer simulations, we assume the cometary coma to be an optically thin cloud containing particles in the form of spheroids, fractal aggregates composed of spherical monomers, and mixtures of spheroids and aggregate particles. We obtain a good semi-quantitative agreement between all polarimetric data for the observed distant comets and the results of numerical modeling for the following models of the cometary dust: (i) a mixture of submicrometer water-ice oblate spheroids with aggregates composed of submicrometer silicate monomers; and (ii) a mixture of submicrometer water-ice oblate spheroids and aggregates consisting of both silicate and organic monomers. The michrophysical parameters of these models are presented and discussed.

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